

Social homogamy, early industrialization, and marriage restrictions in the canton of Lucerne, Switzerland, 1834–75

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The modernization thesis assumes decreasing relevance of an individual's family background to various aspects of modern and industrial life, which should also translate into a decrease in marital homogamy by social origin. However, long-term historical processes are rarely unidimensional and monotonous, and multiple processes may mask one another. For example, although previous research provides evidence for a relationship between degree of industrialization and homogamy, most studies have found no clear time trend. Using new data ($N=1,499$) for the Swiss canton of Lucerne from the 19th century, data which include occupational status of fathers (HISCAM), this article approaches from two angles the problem of confounding processes. First, changes in marriage restrictions during the period of study are identified as a significant and unmeasurable confounder. Because the timespan of reinforced marriage restriction is known, time trends in homogamy can be modelled to allow partial disentanglement of the effects on homogamy of modernization and marriage restrictions. Second, although there were few direct measures of modernization taken in Lucerne during that period, two parish level measures can be identified: connection to the railway system, and the proportion of factory workers in the population. Using multilevel models with constraint simultaneous equations for both possible directions of explanation, the analyses reveal homogamy effects of industrialization and marriage restrictions that differ by social strata. In the lower and middle strata, homogamy was stronger in rural areas than in the city of Lucerne, while the opposite was true for the upper stratum. Furthermore, homogamy increased with rising levels of marriage restrictions but in lower and middle strata it decreased with industrialization.

Keywords: social homogamy; industrialization; marriage restrictions; 19th century; Switzerland

Although selection of a spouse is a very personal decision for both partners, it is always shaped by personal as well as structural factors, such as education, social origin, or the opportunity structure of a given context. One result of such assortative mating is homogamy, by which is meant that on average people choose partners who are in many

ways more similar to themselves than to randomly chosen others (Kalmijn, 1998; Schwartz, 2013) and in contemporary western societies the most important of those characteristics might be achieved personal characteristics like education (Blossfeld, 2009; Kalmijn, 1991a). That would be in line with one of the central promises of modernization, which is that it will lead to open, socially fluid societies which ignore purely ascribed characteristics like social origin (Maas & van Leeuwen, 2016) although that promise has been questioned by recent and broadly discussed research on rising economic inequality. Authors like Piketty (2013) or Milanović (2016) have suggested that growing inequality and the increasing importance of capital returns could lead to a situation similar to that at the end of the 19th century when family resources mattered more than education or achievements. Such a development would be in complete opposition to the prediction of liberal economic theorists like Kuznets (1955), or Kerr, Dunlop, Harbison, and Myers (1960) and Treiman (1970) who were proponents of the modernization thesis. They assumed decreasing inequality, and continual reduction of the importance to status allocation of ascribed characteristics like social origin.

In this article I shall analyse homogamy by reference to the social status of parents. The underlying assumption is that a strong link between social origin and a variety of aspects of the lives of brides and grooms means that we may presuppose strong homogamy by parental status. That in turn – all other things being equal – will lead to a decrease in the general importance of social origin in a given society and results in declining influence of social origin on selection of spouses (cf., Kalmijn, 1991b; Zijdemans & Maas, 2010). Therefore, analysing homogamy in respect of social origin (subsequently abbreviated to “social homogamy” or simply “homogamy”) is one possible way to study the importance of social origin for individual lives. Applied to an area and period of industrialization, analysing social homogamy also provides a test for

the “logic of the industrialization process” (Kerr et al., 1960, p. 34): the assumption that industrialization is the most important driver for the decreasing importance of social origin. An analysis of social homogamy might therefore complement other analyses of social origin effects in such periods, such as studies of intergenerational social mobility using historical data (Lippényi, Maas, & van Leeuwen, 2015; van Leeuwen, Maas, Rébaudo, & Péliissier, 2016; Zijdemann, 2009). More generally it also adds to the debate inspired by the writings of Le Play (e.g., 1877-79) about whether industrialization and urbanization have changed the organization of the family (Janssens, 1986; Laslett, 1974; Puschmann & Solli, 2014).

While homogamy might have changed according to the modernization thesis, modernization is unlikely to be the only relevant factor affecting changes in homogamy over time. For example, not only can the question of who marries whom be related to social origin, but so can the question of who gets married in the first place. The relationship itself, too, may change over time. As a reaction to 19th century pauperism many local and central authorities in Switzerland and other German speaking areas reinforced existing marriage restrictions with the aim of preventing the poor from proliferating (Head-König, 1993; Mantl, 1999; Matz, 1980). By placing emphasis on inherited property rather than on personal income, strong marriage restrictions helped to maintain unequal access to marriage (Mantl, 1999). In other words, the strengthening of marriage restrictions may have counteracted the general decreasing importance of social origin over the course of modernization. It is worth noting here that modernization and increasing marriage restrictions were not independent trends. For many commentators of the 19th century, the widespread pauperism was caused by industrialization (Mantl, 1999) – which meant that stricter marriage restrictions were an indirect reaction to modernization.

Using new data drawn from 19th century canton of Lucerne this article aims to analyse the combined effects of industrialization and marriage restrictions. Lucerne operated some of Switzerland's most severe marriage restrictions (Head-König, 1993) and while it remained primarily agrarian certain areas saw unmistakable industrialization (Dubler, 1983; Schnider, 1996). Furthermore, Lucerne is one of the few cantons for which sources are available that systematically include the occupations of the fathers of both spouses in a marriage. For the period 1834–75 the central authorities of Lucerne took control of the church records and required parish priests to include in marriage registers information about occupations (Gössi & Huber, 2001). The period covers the early industrialization of certain areas of the canton but coincided too with a peak in marriage restrictions around 1865, whereafter they were relaxed again toward the end of the period (Bossard-Borner, 2008, pp. 532–550). These features of the data allow it at least partly to disentangle the effects of industrialization and changing marriage restrictions, even though only indirect measurements, such as illegitimacy rates, are available that do not allow estimating the severity of the marriage restrictions on the local level. However, two direct measurements of modernization are available at the level of individual parishes and they enrich the data. A variable on the presence of railway stations measures the availability of modern means of transport, and the proportion of factory workers serves as a proxy for the level of industrialization of a given parish. Although relatively crude, both those measures complement the indirect test of modernization effects using time trends. That is of special significance because most previous studies found no clear time trends (Bull, 2005; Dribe & Lundh, 2009; Maas & van Leeuwen, 2005; van Leeuwen & Maas, 2002), but were able to identify the effects of more directly measured industrialization (Maas, van Leeuwen, Péliissier, & Rébaudo, 2011; Zijdemann & Maas, 2010).

Research on social homogamy in 19th century Switzerland is actually very scarce and the few existing studies examine only the two Protestant cities of Winterthur (Schumacher & Lorenzetti, 2005) and Geneva (Widmer, 1993). This analysis of new data from a catholic and predominantly agrarian canton like Lucerne therefore addresses an area of which nothing was previously known about homogamy. Consequently, one of this article's aims is to describe the homogamy by social origin seen in the city of Lucerne and the rural area around it, and to trace changes to it over the 40 years of the observed period (1834–75). However, the article's main goal remains to derive and test hypotheses about how social homogamy changed with modernization, and how the process was affected by changing levels of marriage restriction in the canton.

The remainder of this article is organized as follows. The next section presents the background to the 19th century canton of Lucerne thereby providing the context for the marriages and marriage registers analysed in the article. Description of the historical background is followed by the theoretical considerations from which the hypotheses are derived and by a description of the data, measurements and statistical models that allowed us to test the hypotheses. Finally, the results are presented and discussed.

1 The canton of Lucerne and the sources

Lucerne is a medium sized canton in central Switzerland (see map at Figure 1) and throughout the 19th century remained a predominantly agrarian canton with the city of Lucerne its undisputed capital. At the beginning of the 19th century the canton was divided into three agrarian areas, with the partly alpine south defined by animal husbandry and production of milk and cheese, while the hilly central and flatter northern region devoted to the cultivation of grain, although the two areas differed in their modes of production. In central Lucerne canton field crops and fodder for small

livestock were produced on separate farms on mostly private land. In the northern areas by contrast, production was still organized using the three-field system which required collective farming ('Flurzwang'), as individual farmers' properties were dispersed over all three fields (Bossard-Borner, 1998, pp. 38–42; Dubler, 1983, pp. 71–95).

---Figure 1 about here [Map] ---

This 'Flurzwang' and the requirement to deliver tithes in the form of a prescribed composition of field crops, had constrained agricultural innovation during the 18th century until change came during the first half of the 19th century. Then, over the rest of the century agriculture in Lucerne canton saw strong modernization as municipalities were allowed to privatize parts of their commons, action which often led to improved situations for small farmers who could now increase production above subsistence level (Bossard-Borner, 1998, pp. 309–312). In addition the optional tithe redemption, together with the abolition of the 'Flurzwang', allowed wealthy farmers to change to more lucrative animal husbandry which increased their cash crops and in turn laid the foundation for the mechanization of farming towards the end of the 19th century. Those factors were the precondition for rational and market-oriented agriculture which increased yields enormously (Bossard-Borner, 1998, pp. 306–314; Dubler, 1983, pp. 95–113).

In contrast to the rapid development of the agrarian sector, modernization of other sectors and factory industrialization took longer to take off. There were areas with growing industry, mainly around the capital and in the north eastern Wiggerthal (Bossard-Borner, 1998; Dubler, 1983). Before 1850 there were only a small number of factory workers in the canton, many of them employed in factories processing horsehair, a sector that disappeared sometime in the half of the 19th century. To a certain extent however, by the time of the second factory census in 1877, which was shortly

1 after the period analysed in this article, the situation had changed. Although the overall
2 proportion of factory workers remained low and the canton's industrialized area was
3 roughly the same as it had been in 1850, industry became a significant factor in those
4 few municipalities that could boast factories. Around Lucerne city for example, the
5 proportion of factory workers approached 10% of the population as steel production,
6 machine construction, and above all the textile industry had become relevant sectors
7 (Schnider, 1996, pp. 41–56). Industrialization gained pace as some parts of the canton
8 were connected to the Swiss railway system (see Figure 1) which also enabled the rise
9 of Lucerne as an important tourist destination (Dubler, 1983; Schnider, 1996).

10 The development of Lucerne as a modern tourist resort was also a significant
11 accelerator of the growth of the city's population, which was driven mainly by
12 immigration, with female domestic workers featuring prominently among the
13 predominantly intra-cantonal immigrants (Balthasar, 1988; Head-König, 1999).
14 Therefore, migration to the city of Lucerne consisted not only of short-term movement,
15 for example that of young people working in the city but returning when somewhat
16 older, (see for example Ehmer, 2011), but also of many people who remained in the
17 city. Migration to Lucerne city and its surroundings continued even after economic
18 growth slowed down at the end of the 1840s, so that now unemployed migrants visibly
19 added to the growing number of paupers during those years. In the middle years of the
20 century the canton experienced economic tension due not only to growing competition
21 from more industrialized areas but because of bad weather too which led to high prices
22 of bread and potatoes (Bossard-Borner, 2008, pp. 532–541). This difficult situation was
23 accentuated by a short war which preceded the partially forcible and conflict-laden
24 integration into the newly-founded liberal federal state of Switzerland in 1848 (Bossard-
25 Borner, 2008, 2010).

1 By contrast with other cantons Lucerne did not outsource the resulting burden of
2 poor relief by actively supporting emigration overseas. As in other German-speaking
3 areas (Mantl, 1999; Matz, 1980) the authorities tried to forbid reproduction among the
4 poor by strengthening existing marriage restrictions. That contributed to a marriage
5 pattern in Lucerne that perfectly fits the “European Marriage Pattern” as depicted by
6 Hajnal (1965, p. 101) namely “a high age at marriage and a high proportion of people
7 who never marry at all”.¹ Marriage restrictions were imposed on men who had either
8 relied on poor relief after the age of 16 and had not repaid it, or who lacked the means
9 the local authorities considered necessary to raise offspring in an “honest way” (Kanton
10 Luzern, 1831–1840, pp. 261–270, cited in Bossard-Borner, 2008, p. 545). The central
11 authorities backed up their rigid restrictions. Their judicial response to appeal against
12 refusal of permission to marry was very restrictive until 1857, when as a result of the
13 improved economic situation it suddenly became more liberal (Bossard-Borner, 2008,
14 p. 545). The change in legal practice was reinforced by the fact that during the
15 economic crisis, high marriage fees had become unaffordable to more and more people.

¹ To the best of my knowledge, no comprehensive demographic statistic exists for the 19th century canton of Lucerne. However, in the sample used for this study the median age at first marriage of women and men was 27.0 and 31.9, respectively. From an additional sample collected from the death registers of five parishes (Altishofen, Entlebuch, Ettiswil, Hitzkirch, Kriens, and Lucerne) it can be estimated that about 20% of men survived beyond the age of 45 remained unmarried. That corresponds to the number cited by Hajnal (1953, p. 85) for Switzerland and falls in about the middle of the range for the Austrian alpine region found by Ortmayr (1995); data based on: StALU, FA 29/8, 51, 64, 91, 118, 119; KZ 33, 35, 37, 39, 41.

One consequence was that the illegitimacy rate which had been slowly increasing during the first half of the 19th century, rose quickly after 1845 until it peaked at about 15% in 1864, before falling back to about 5% at the beginning of the 1870s (Bossard-Borner, 1998, pp. 297–306, 2008, pp. 532–550; Head-König, 1993). The interplay of economic and political factors thus led to reinforced demographic characteristics of low marriage and high illegitimacy rates in the 19th century canton of Lucerne. For the present study, those demographic characteristics had three consequences:

(1) The marriage restrictions were successful insofar as married individuals indeed belonged to a socially selected population: among those who died aged between 45 and 64, 94% of merchants died married but only 47% of farm workers did so.²

(2) The high illegitimacy rate may point to existing relationships out of wedlock. In many cases however, multiple fathers were involved when women had multiple illegitimate children (Kok & Leinarte, 2015). In other words, a high illegitimacy rate might suggest a high rate of unmarried couples although not necessarily so. As there is no systematic source for that time for unmarried couples, analysis of homogamy is therefore necessarily restricted to marital homogamy.

(3) Increased marriage restrictions in the middle of the 19th century might have affected homogamy by social origin (see next section for arguments), which might in turn have disturbed trends caused by processes such as industrialization. According to the literature however marriage restrictions, while strong in the middle of the century, were relatively weak at the beginning

² Source: see note 1.

1 and towards the end of the period observed in this article (1834–75) (Bossard-
2 Borner, 2008, pp. 532–550). Therefore the effect of marriage restriction on
3 homogamy can be expected to have evolved accordingly, which helps to
4 disentangle it from the effects of other processes.

5 Because of the relatively high proportion of individuals who did not marry at all,
6 marriage registers are a selective source. Nevertheless they are the only available source
7 for the large scale study of parental homogamy in 19th century Lucerne. They are even
8 an exceptional source, as most marriage registers in Switzerland do not include
9 occupational titles of parents in any systematic way. That is true for the canton of
10 Lucerne too, but not for the period 1834–75 investigated in this article. During a liberal
11 intermezzo of 1831–41 the state of Lucerne decided to take control of parish registers.
12 Pre-printed tables were issued for priests to fill in, and the law defined how state
13 officials were required to monitor the maintenance of the registers.³ In comparison with
14 other areas and periods then, for this period the canton of Lucerne offers marriage
15 registers of exceptional quality, as the information in them is not only rich but was
16 consistently and systematically collected. Their data therefore allows analysis of
17 processes of social stratification, including homogamy by social origin.

18 **2 Theoretical considerations and hypotheses**

19 To explain changes in homogamy by parent's social status two basic theoretical
20 questions must be addressed. First, why such homogamy can be expected in the first

³ The corresponding decrees can be found at the beginning of each of the books. For this project we used the copies maintained by a municipality official and kept by the State Archives of Lucerne: StALU, A 975 and KZ 23-27, 54-56; cf.: Gössi and Huber (2001).

1 place And why the extent of homogamy may be assumed to change.

2 A useful framework for the analysis of spouse selection and the factors driving
3 homogamy is the concept of the “marriage market”. In a marriage market men and
4 women seek partners according to their individual preferences but face constrained
5 opportunities (Becker, 1973; Goode, 1964; Schwartz, 2013). Preferences and constraints
6 alike can then lead to social homogamy, as the of actors in the marriage markets tend to
7 favour status maintenance (Boudon, 1974), and to wish to maximize the socioeconomic
8 resources of a future family and to prefer a partner with whom they share at least some
9 cultural values (Kalmijn, 1998). The preferences for similarity and for more resources
10 both lead to homogamy, as if both partners want more of the same and neither wishes to
11 marry down, “everyone ends up with someone roughly similar to themselves”
12 (Schwartz, 2013, p. 453). Of course, “everyone” is an exaggeration, as few will be able
13 to satisfy all their preferences so in order to satisfy certain of them they may reduce
14 their expectations in respect of others. That provides room for exchange; for example a
15 relatively aesthetically unattractive but influential person might be able to marry an
16 uneducated but wealthy partner (cf., Merton, 1941), a process which can explain a
17 mating process with a heterogamous outcome. However, if it make sense to pool the
18 resources of both partners, with resources seen as complements, not substitutes, the
19 resulting partnership will nevertheless tend to be homogamous (Becker, 1973; Edwards,
20 1969). In other words, if both partners value a particular resource, then having more of
21 it (all else being equal) will improve the chances of mating with someone who
22 possesses the same resource.

23 ***2.1 Modernization thesis: the changing importance of social origin***

24 My intent in this article is to analyse homogamy by the status of the parents of a bridal

1 couple. Homogamy in that respect can exist only if the resources of bride and groom are
2 linked to those of their parents. In other words, homogamy by social origin is a
3 consequence of the association between the particular status of individuals and that of
4 their parents. It is here that the modernization thesis comes into play.

5 In the literature on social inequality and stratification the term “modernization
6 thesis” usually refers to a construct based on the writings of Kerr et al. (1960), Parsons
7 (e.g. 1960), and other North American social scientists of the 20th century (cf., Erikson
8 & Goldthorpe, 1992, p. 3). In other words it is based on the concept of modernization in
9 its “classical” form that took shape in the 1950s. In that view “modernization” is a
10 combination of unidirectional processes mutually reinforcing each other, namely
11 industrialization, democratization, bureaucratization, rationalization, and secularization
12 (Mergel, 2012). The modernization thesis assumes that the change from a pre-industrial
13 to an industrial society was quite fundamental and changed many aspects of life. While
14 many aspects of it have been criticized (e.g., Tipps, 1973), the modernization thesis has
15 created influential hypotheses in research on social stratification (Hout & DiPrete,
16 2006). In that respect the modernization thesis states that social origin loses its
17 importance in the allocation of social positions. More specifically, modernization is
18 thought to change the process of status attainment, for while the thesis assumes that in
19 traditional societies the direct link between parent’s and child’s status is dominant, it
20 presumes that in modern societies an indirect path via education will be the main path
21 connecting the status of parents and children. However the indirect path will not
22 completely replace the direct one, which results in a weakening link between the
23 generations (Blau & Duncan, 1967; Treiman, 1970).

24 Following Treiman’s (1970) restatement of the modernization thesis, structural
25 changes caused by industrialization result in reduction of the direct effect of social

1 origin on an individual's social position. First, the reduction of the proportion of the
2 labour force engaged in agriculture on the one hand and on the other the creation of new
3 jobs following technological change and specialization, reduces too the number of jobs
4 for which skills developed by assisting parents are beneficial (Knigge, Maas, van
5 Leeuwen, & Mandemakers, 2014; Lipset & Zetterberg, 1959, pp. 57–60). Second, the
6 increasing size of enterprises brings with it rationalization and bureaucratization of
7 production. Rather than relying on ascribed characteristics like social origin, employers
8 therefore increasingly consider such things as achievements in formal education, for
9 such characteristics are more relevant to an estimation of likely productivity (Treiman,
10 1970). Together, such changes make it more difficult to use existing socioeconomic
11 resources directly to grant status maintenance of the succeeding generations.

12 Conversely, those changes ought to be expected to open formerly closed social
13 positions to individuals less well endowed with resources of social origin. Furthermore,
14 the modernization thesis predicts that political, social, and cultural resources will be
15 available to more people. In that view democratization improves the ability of the
16 disadvantaged classes to profit from the economic growth generated by industrialization
17 (Simpson, 1990). Furthermore, educational expansion not only provides the population
18 with the knowledge and skills necessary for newly created occupations, but also creates
19 opportunity for pupils to meet others from different class backgrounds (Kerr et al.,
20 1960, pp. 36–37; van Leeuwen & Maas, 2005). The emergence of mass media and
21 modern transport supports the development of a common culture and with it the
22 diminution of differences “in attitudes and behavior” by social origin (Treiman, 1970,
23 p. 219).

24 Taken together, these arguments imply decreasing influence of social origin over
25 the course of modernization, which means too that homogamy should decline in respect

of the social status of parents, for at least two reasons. First, according to the modernization thesis cultural resources depend decreasingly on social origin. Consequently, the cultural similarity preferred by actors on the marriage market depends less and less on social origin. Second, when actors try to maximize resources for their future family, social origin is of decreasing relevance, because the modernization thesis assumes the weakening of links between an individual's own resources and those of his or her family of origin (Kalmijn, 1991b). That leads us to this first hypothesis:⁴

H1: Social homogamy has decreased over time.

Because urbanization is viewed as being inherently a driver of modernization (Kuznets, 1955; Treiman, 1970), we may expect the importance of social origin to decrease more significantly in cities than in rural areas. Furthermore, the city of Lucerne was more advanced than other parts of the canton in many of the aspects discussed above. It had better schools and provided education to a higher level (Boesch & Kottmann, 1974; Pfenniger, 1998) offered a wider variety of occupations (Dubler, 1983) and was the home of most of the canton's early entrepreneurs (Bossard-Borner, 1998, p. 318) and of its intellectual elite (Bossard-Borner, 1998, pp. 353–360). It was also the capital, and the canton's central administration and its civil servants were based there (Lischer, 2016). That leads us to this second hypothesis based on the modernization thesis:

H2: Social homogamy was stronger in rural areas than in the city of Lucerne.

⁴ For a similar hypothesis, see Zijdeman and Maas (2010, p. 399).

2.2 *The effect of marriage restrictions*

However, for the period of interest to us here the assumption implicitly made by the modernization thesis that “everything else was equal” was clearly not correct. With the marriage restrictions discussed in the last section an important constraint on the selection of spouses changed significantly in the period studied in this article. In the canton of Lucerne the marriage restrictions did not refer directly to the resources of a potential bridal couple’s parents, but the authorities considered property rather than income as being important to the ability to raise offspring in an “honest way” (Kanton Luzern, 1831–1840, pp. 261–270, cited in Bossard-Borner, 2008, p. 545). An individual’s wealth and property depended much more on his or her parents’ resources than on income (Head-König, 1993; Mantl, 1999). Wealth and property inherited from the family of origin therefore became more decisive than other resources which were not directly linked to the family of origin. Conversely, marriage may be expected to be increasingly homogamous in respect of resources related to social origin and less to other characteristics. In short, the marriage restrictions of Lucerne probably increased the importance of the family of origin and, consequently, of homogamy by parental status. If we assume at least some degree of social homogamy, the selection of their spouses by high status individuals should not be substantially affected by marriage restrictions, because high status individuals only rarely chose their partners from the strata affected by marriage restrictions. That leads us to this third hypothesis, which is in two parts:

H3a: Social homogamy increases with marriage restrictions.

H3b: Marriage restrictions mainly affect homogamy among individuals of lower and middle social origin.

2.3 *Modernization and marriage restrictions combined*

It is as impossible perfectly to measure Lucerne's modernization as it is to measure the extent of its marriage restrictions. Nevertheless, we can make certain assumptions about the combination of the effects of the two. Changes to the marriage restrictions it is relatively well known from the literature. Restrictions increased in the first part of the analysed period, reached a peak around 1865 and then declined rapidly (for the exact timing, see the discussion in the next section). By contrast, the typical interpretation of the modernization thesis assumes the modernization process to be more or less linear development over time (cf., Erikson & Goldthorpe, 1992, p. 21). It is therefore possible to deduce a basic hypothesis for how homogamy changes over time, given the presumed effects of marriage restrictions and modernization.

---Figure 2 about here---

Figure 2 shows the combination of the effects of marriage restrictions and modernization. Because marriage restrictions are relevant primarily for individuals of lower and middle social origin, the combination of the two effects does not affect the relationship between modernization and homogamy. Therefore the hypothesis of decreasing homogamy over time (*H1*) remains directly applicable to individuals from higher social origin, irrespective of any marriage restrictions (Figure 2b). By contrast, for individuals of lower and middle class origin (Figure 2a) the increasing marriage restrictions in the first part of the observed period might be expected to cancel out or even reverse the diluting effect of modernization. For the period after 1865, however, both changes worked in the same direction, so that we may expect a clear decrease in social homogamy for that period. The combined effects on homogamy of marriage restrictions and modernization can therefore be summarized by these hypotheses:

1 *H4a*: Homogamy among individuals of higher social origin decreased over the
2 whole period (1834–75).
3 *H4b*: Homogamy among individuals of lower and middle social origin stagnated or
4 increased in the period 1834–64.
5 *H4c*: Homogamy among individuals of lower and middle social origin clearly
6 decreased in the period 1865–75.

7 **2.4 Direct measurements of industrialization: the proportion of factory** 8 **workers and the presence of railway stations**

9 So far, modernization has been discussed as a latent concept that develops with time.
10 Because of that its effects can be tested indirectly, in this case by analysing social
11 homogamy over time. That is in line with how classical studies have tested the
12 modernization thesis (for example, Breen, 2004; Erikson & Goldthorpe, 1992).
13 However, certain more recent studies have identified measurable sub-dimensions of
14 modernization, such as the number of steam engines, expansion of education, and the
15 spread of mass media. The effects of those things on phenomena such as social mobility
16 have been tested (Knigge et al., 2014) and on social homogamy (Zijdeman & Maas,
17 2010). Unfortunately, most such modernization measures are not available for the
18 canton of Lucerne, although with two exceptions. We know the availability of rail
19 connections, and we can make a rough estimate of the proportion of factory workers in
20 each of the canton's municipalities.

21 Two lines of reasoning lead us to expect the availability of a rail connection to
22 be related to the extent of homogamy. First, modern transport may be assumed to
23 contribute to a common culture in which people do not differ greatly by geographical
24 and social origin (Treiman, 1970). In other words, modern means of transport tend to
25 reduce homogamy by social origin by loosening the link between the status of parents
26 and children. A second line of reasoning considers the impact of things like railways at
27 the individual level, for although rarely absolute, geographical boundaries can severely

1 reduce the likelihood of ever meeting a person from the other side of such a boundary.
2 Modern transport therefore widens the “marriage horizon” of those looking for a spouse
3 and thereby extends the boundaries of the marriage market (van Leeuwen & Maas,
4 2005). The scope of the marriage market can affect parental homogamy via two paths.
5 First, in wide marriage markets the likelihood of meeting someone of a different social
6 background will be higher than in a narrow market, since living close-by makes a
7 similar social background more likely (Goode, 1964, p. 34; Kalmijn & Flap, 2001; van
8 Leeuwen & Maas, 2005, pp. 5–10). Second, a widening of the marriage market over
9 time means that the social contacts of young people tend to go beyond the social
10 networks of their parents, in both geographical and social terms.⁵ Both the lines of
11 reasoning lead to the same hypothesis:

12 *H5: Homogamy was lower in parishes with a rail connection than in parishes*
13 *without one.*

14 The argument for an existing relationship between the proportion of factory workers in
15 a given area and the level of social homogamy follows similar lines of reasoning. A
16 high proportion of factory workers is in the first place a proxy for the industrialization
17 of an area and according to the modernization thesis may be associated with lower
18 overall homogamy by social origin than in areas with a low proportion of factory
19 workers (Treiman, 1970). Furthermore, factories bring together workers of different but
20 low to middle social origin, which might contribute to the fading of the distinctiveness
21 of social origin. Social networks formed in a factory can lay the foundations of future
22 marriage. In mixed industries like the textile industry factory workers might meet a

⁵ Blossfeld and Timm (2003, pp. 10–11) made this point about educational expansion.

future spouse actually at work (Maas et al., 2011). As individuals of high social origin rarely became factory workers the proportion of factory workers is mainly relevant to individuals of lower or middle social origin.

H6: Homogamy among individuals of low and middle social origin was weaker in parishes with a high proportion of factory workers than in other parishes.

3 Data, measurements, and methodological approach

3.1 Data

The dataset used for this study was taken from the marriage registers presented in the first section and has been sampled following a stratified design. Marriages from three strata have been sampled independently: from the city of Lucerne, from parishes with no industry, and from parishes with at least some industry.⁶ We used a two-stage sampling design for the large area with no industry, randomly choosing 25 of 63 parishes and then sampling marriages within the selected parishes. The chosen design ensured that each marriage in the area was selected with the same probability (Jann, 2007). For all the 13 parishes with some industry and for the city of Lucerne a simple random sampling procedure was used (see Figure 1 for an overview of the parishes included). Information on 2,212 marriages was collected on both first and higher-order marriages. As the mating processes might differ for higher-order marriages, data only on first marriages was used for the analyses presented in this article. As a result, the

⁶ Parishes where the proportion of factory workers exceeded 2% were included in the stratum of parishes with at least some industry (according to Schnider (1996, p. 48)).

analyses build on data on 1,499 marriages (excluding missing values).⁷ The sampling weights used for the statistical modelling compensate for the over- and under-representation of certain areas due to the stratified design, and ensure that the data set is representative of the whole canton of Lucerne.

3.2 *Measuring homogamy*

In this article social homogamy is taken to mean that individuals tend to select a spouse of similar social origin. Thus as a first step, the social status of fathers must be measured to estimate the strength of social homogamy for a given area and period. To achieve that the occupational titles included in marriage registers can be coded according to the ‘Historical International Classification of Occupations’ (HISCO) proposed by van Leeuwen, Maas, and Miles (2002). A scale for occupational stratification is available for this classification-scheme: the ‘Historical CAMSIS’ (HISCAM) is based on social interactions, and ranks occupations on a continuous status scale (Lambert, Zijdeman, van Leeuwen, Maas, & Prandy, 2013).⁸ Such a measurement of the status of fathers of brides and grooms means we can use the correlation between the two as a measurement of homogamy by social origin, as it indicates how strongly parents’ statuses are associated (graph (a) in Figure 3). Regression models yield an estimate of the effect of the social status of one father on the social status of the other, so that interaction effects can then be used to explain those effects and so to test the hypotheses (graph (b) in Figure 3; for details see the technical discussion at the end of

⁷ 380 cases were discounted because either the bride or the groom had been married before, 333 cases were discounted because of missing values for one of the relevant variables.

⁸ I have used the cross-nationally standardized version 0.1 for this article: HISCAM (2006).

1 this section).

2 ---Figure 3 about here---

3 Some of the hypotheses presented in the last section distinguish between homogamy
4 among individuals of lower to middle and high social origin. To include that distinction
5 in the analyses I split the explaining status variable into two linear splines. That means
6 that the relationship between the statuses of the two fathers is not modelled as a single
7 linear function, but rather with two linear functions knotted together. Separate estimates
8 are therefore yielded for the association between the statuses of the fathers of each
9 spouse, one for fathers with low to middle status and one for those of higher status. For
10 this study I set the status of general farmers as the threshold between lower and higher
11 status at (i.e., a HISCAM value of 60.9) so that farmers are at the top of the range of
12 occupations defined here as of “low to medium status”. My thinking for that decision
13 was that the occupational structure of the canton of Lucerne was strongly marked by
14 two occupations, namely those of farm workers and of general farmers (compare Figure
15 4 and its discussion in the next section). While the former were at the low and
16 precarious end of the distribution of fathers’ statuses, the latter occupied the highest
17 position in the agrarian sector. Considerably higher positions existed (father’s HISCAM
18 values range from 32.5 to 99), but they applied only to a clear minority of the fathers
19 (about 20% in the city of Lucerne, and only about 6% in the countryside). From that
20 point of view general farmers therefore stood at the transition point from the lower and
21 middle to higher social status.⁹ I therefore used two linear splines with a knot at the

⁹ Figure 4 provides an additional argument for setting the threshold to the HISCAM value of a general farmer (60.9) as the relationship seems to change at this point.

HISCAM value for general farmers to estimate homogamy simultaneously among individuals of lower and middle origin, and of high social origin within the framework of regression models.¹⁰

3.3 Variables explaining homogamy

The same spline-based approach can be used to model time-trends in homogamy based on the date of a marriage. To test the hypotheses resulting from combining the effects of modernization and marriage restrictions the model should allow the time trend to change at the moment marriage restrictions began to be loosened again. As discussed in the section on the history of Lucerne canton, the marriage restrictions there peaked somewhere between 1856 and 1864 (Bossard-Borner, 2008, pp. 544–548). Because the restrictions were relaxed more rapidly than they were tightened, the turning point appears to be towards the end of that period. Furthermore, the data suggest that the effect on homogamy probably lagged behind the marriage restrictions. I tested three plausible spline definitions and although the differences are small, the solution best fitting the data is one with a knot at the end of the year 1864.¹¹ While hypotheses *H1* predicting decreasing homogamy will be tested by means of linear overall time trends,

¹⁰ To enhance the interpretability of the interaction effects the explaining status variable is first centred on the knot before it is transformed to the two splines. When *HISCAM* is the original status value, the two splines are defined as follows:

$$HISCAM_1 = \begin{cases} HISCAM - 60.9, & \text{if } HISCAM \leq 60.9 \\ 0, & \text{if } HISCAM > 60.9 \end{cases}$$

$$HISCAM_2 = \begin{cases} 0, & \text{if } HISCAM \leq 60.9 \\ HISCAM - 60.9, & \text{if } HISCAM > 60.9 \end{cases}$$

¹¹ Bayesian Information Criteria (BIC) for the basic model are 333190.8 (knot end of 1860), 333160.7 (end of 1862), 333140.9 (end of 1864), and 333142.4 (end of 1866) respectively.

all other time-based hypotheses can be tested by means of two linear splines, one for marriage dates before 1865 and one for marriage dates thereafter.¹² I modelled those time trends for both the city of Lucerne and the countryside (all other parishes) using three-way interactions between the two splines for the status of fathers, the two splines for dates of marriages, and the indicator for Lucerne city.

Two of my variables at parish level are based on external sources. The first stands for the presence of modern transport and indicates that a railway station was available in the corresponding parish at the time of the marriage concerned. The second variable measures the proportion of factory workers in each parish. Schnider (1996, p. 48) reports proportions of factory workers (adjusted for changes in the definition of factories) in the population of each municipality for the years 1856 and 1877, when factory censuses were carried out. Following his description of the economic cycles and waves of factory establishments (Schnider, 1996, pp. 41–69), we may assume that most of the factory jobs recorded in 1856 had been created around 1850, and that many of the additional jobs recorded in 1877 were created around 1865. That then allows a rough estimate of the longitudinal distribution of the proportions of factory workers in parishes. Schnider (1996, p. 48) reports the proportions in five categories: 0%, 0.1–2%, 2.1–5%, 5.1–9%, and 9.1–44%. For my analyses, I collapsed the first and the last two

¹² As with the explaining status variable, the date of marriage is first centred on the knot before it is transformed to the two splines. When *date* is the original date of marriage, the two splines are defined as follows:

$$date_1 = \begin{cases} date - 31dec1864, & \text{if } date \leq 31dec1864 \\ 0, & \text{if } date > 31dec1864 \end{cases}$$

$$date_2 = \begin{cases} 0, & \text{if } date \leq 31dec1864 \\ date - 31dec1864, & \text{if } date > 31dec1864 \end{cases}$$

categories, because tests have shown that this more parsimonious three-fold categorization leads to the same results as the more detailed one. Therefore, my analyses are based on the following categories of proportions of factory workers in the parishes at the time of the marriage: 0–2%, 2.1–5%, and >5%.

3.4 Methodological approach

As pointed out when discussing the correlation between the fathers' statuses as a measure of homogamy, interaction effects in regression models can be used to test hypotheses on factors affecting homogamy. In other words, to test the effects on homogamy of time, city, proximity of railway stations, and the proportion of factory workers, the corresponding variables interact with the two splines representing father's status. However, the directed nature of regression models (one or multiple independent variable(s) explain one dependent variable) does not directly reflect the more or less symmetrical and mutually dependent nature of how spouses select each other. More technically, regression coefficients are sensitive to variance of both the explained and the explaining variable, which can lead to contradictory results. For example, imagine a shrinking variance over time in the status of the groom's father but not of the bride's father, while the correlation between them remains unchanged. In that situation a model explaining groom's father's status by bride's father's status will indicate decreasing homogamy, while the model for the opposite direction of explanation will lead to the opposite conclusion. This is problematic because there is no reason to favour one of the two directions of explanation. A solution to that problem is to estimate both directions of explanation simultaneously, and to constrain the coefficients related to homogamy to

1 be equal for both directions of explanation.¹³ Unobserved differences between contexts
 2 can confound the results, and one way to control for this at least partly is to include
 3 random effects on the levels of parishes by estimating multi-level models.¹⁴ Multi-level
 4 models with effects constrained, but simultaneously estimated equations for both
 5 directions of explanations can be fitted within the framework of structural equation

¹³ Constraint across the two directions of explanation are the two splines for father's status and the interaction effects of the covariates with those splines. Not constrained are the constants and the main effects of the covariates.

¹⁴ Random slopes for the two status splines allow to control for differences in social homogamy between parishes. Preliminary results showed, however, that the estimated variances of the random slope for the lower status spline was very small. Consequently, the results remain qualitatively the same when removing the random slope. Favouring the more parsimonious of the otherwise equal models, I therefore used multilevel models clustered by parish, with random intercepts and a random slope for the higher (but not for the lower) status splines. The equations read as follows:

$$\begin{cases} HISCAM_{bfip} = \beta_{ip}^{low} \cdot HISCAM_{gfip}^{low} + \beta_{ip}^{high} \cdot HISCAM_{gfip}^{high} + \gamma^b \cdot X_{ip} + \mu_p^b + \varepsilon_i^b \\ HISCAM_{gfip} = \beta_{ip}^{low} \cdot HISCAM_{bfip}^{low} + \beta_{ip}^{high} \cdot HISCAM_{bfip}^{high} + \gamma^g \cdot X_{ip} + \mu_p^g + \varepsilon_i^g \end{cases}$$

$$\beta_p^{low} = \alpha^{low} + \delta^{low} \cdot X_{ip} \quad \beta_p^{high} = \alpha^{high} + \delta^{high} \cdot X_{ip} + \tau_p$$

where $HISCAM_{bfip}$ and $HISCAM_{gfip}$ is the HISCAM of the fathers of bride and groom, X_{ip} is a set of covariates (varying either on individual- or parish-level (subscript i , and p , respectively)), β_{ip}^{low} and β_{ip}^{high} are the homogamy parameters for low and high status homogamy, α and β are parameters explaining homogamy (constraint to be equal for both equations), τ_p is a random slope, γ are the equation-specific parameters of the main effects, and μ_p an equation-specific random intercept.

models.¹⁵

The results for homogamy presented in the next section are based on four such models. The first model uses linear time trends to estimate homogamy over time for rural areas and Lucerne city. The second replaces the overall time trend by two linear splines, in order to test changing trends. The third and fourth models additionally include the variables for a nearby railway station, or dummy variables for parishes with respectively a factory worker proportion of 2.1–5% and more than 5%.¹⁶ For these models, the observations from the city of Lucerne have been excluded, as there is not enough contextual variation to estimate the effect of the two variables. To enhance the readability of the results only post-estimation results (such as average marginal effects or linear combinations of the coefficients) and graphical representations of the coefficients are reported in the main body of the article (but compare the full regression tables for all models in the appendix).

4 Results

As outlined in the last section, this article understands social homogamy as the correlation between the status of a bride's father and that of a groom's father. It is an inherently bivariate concept which cannot be measured on the individual level nor reported in tables with descriptive statistics. All the same, Table 1 gives a first overview

¹⁵ I should like to thank publicly here one of the anonymous reviewers for the suggestion to use structural equation models to combine the advantages of the constraint approach with those of multi-level models. Models estimated using Stata 15 (StataCorp, 2017).

¹⁶ To avoid biases caused by collider variables I used separate models to estimate the effects of availability of a nearby railway station and of industrialization (Elwert & Winship, 2014).

of the measures behind homogamy: the status of the groom's and bride's fathers measured on the HISCAM scale. Overall, the distribution of the two are similar. They range from 32.5 (HISCAM value for not closer defined workers) to 99 (HISCAM value assigned to occupations such as medical doctors, lawyers, or professors), have a mean of between 51 and 52 ('cartwright' is a frequent occupation in this range) and a standard deviation of about 12. The fathers of a couple who were married in the city had a status on average about half a standard deviation higher than the fathers of those who married in the countryside. While the average of the bride's father's status is slightly higher than that of the groom's father, the mean difference and the individual difference are marginally significant at most (unpaired: $t(2996) = 1.27, p = .20$ and paired: $t(1498) = 1.77, p = .08$ respectively).

---Table 1 about here---

---Figure 4 about here---

Figure 4 gives a first impression of the association between the statuses of the two fathers. The scatterplots, both for the countryside and for the city, are characterized by a square in the lower left corner, formed by farm labourers (HISCAM: 37.1) and general farmers (HISCAM: 60.9). The graph shows too that a daughter or son of a farm labourer rarely married the son or daughter of a man whose occupational status was higher than that of a general farmer. Although the social stratification of the fathers of those married in the city was also marked by farming occupations, their statuses were clearly more evenly distributed around the mean. In the countryside, by contrast, the picture was dominated by occupations with rather low statuses.

1 The local polynomial (lpoly) smooth plots in the same graph show how the two
2 statuses were locally associated. Three observations from those smoothers are
3 noteworthy. First, the relationship in the countryside was steeper overall than that in the
4 city. Simple correlations confirm that observation, as it was substantially tighter outside
5 ($r = .54$) than inside the city of Lucerne ($r = .31$). Second, for rural Lucerne, the lpoly
6 line bends just above the status of general farmers (HISCAM 60.9), while the
7 relationship is otherwise rather linear, both inside and outside the city. Third, whereas
8 the two directions of explanation generally agree very well, that is less true for higher
9 status in the countryside.

10 Two aspects concerning the other variables deserve to be highlighted. First, the
11 means of year of marriage lie after the middle of the observed period (1834–75),
12 especially in the city. That stems from an increase in marriages towards the end of the
13 period. Second, although the factory industry particularly flourished around the city of
14 Lucerne, the proportion of factory workers in the city itself never surpassed the
15 threshold of 2%.

16 **4.1 *City versus countryside***

17 Comparing homogamy in rural Lucerne and the city of Lucerne, the results presented in
18 Figure 5 show distinct results for homogamy between individuals of lower and higher
19 social origin. In rural Lucerne, a high level of homogamy can be found for marriages of
20 couples of low and middle status origin. On average, one partner's father's status was
21 .63 points higher on the HISCAM scale if the other partner's father had a status that was
22 one point higher. At the same time, homogamy among high origin individuals was very
23 low in the countryside, and cannot be said to be significantly different from zero – also
24 because of the low number of observations. In the city of Lucerne, the situation was

different. On the low to middle origin side, the association was estimated at .25 – about .38 lower than in the countryside ($p < .001$). In contrast to the countryside, homogamy among high origin individuals in the city seems to have been higher than among those of low to middle origin, although the difference between low and high origin homogamy is not statistically significant ($p = .177$). However, homogamy among those of higher social origin was clearly stronger for couples married in the city than for those married in other parishes. Because of the low number of cases, that difference is imprecisely estimated and only marginally significant ($p = .052$).

--- Figure 5 about here---

In sum, the model yields mixed results for the contrast between the city and the countryside. For individuals of lower or middle social origin (the vast majority of the population), social homogamy according to parental status was considerably lower in the city than in rural Lucerne. That is in line with the prediction of the modernization thesis (hypothesis *H2*) although that conclusion is not valid for the elites. Homogamy among individuals of high social origin was notable in the city of Lucerne but very low and perhaps even non-existent in rural areas.

4.2 Time trends

Turning to time trends in social homogamy, the distinction between homogamy among couples from lower and middle origin on the one hand, and those from high origin on the other, continued to be important – especially in the rural part of the canton. I estimated two models (appendix, Table A1) to test hypotheses on general time trends (*H1*), changing trends due to changing marriage restrictions (*H3*), and on the combination of the two (*H4*). While the first includes one linear time trend for the whole period, the second uses two linear splines.

Figure 6, based on this latter model, displays the estimated association between the two fathers' statuses by date of marriage separately for lower and higher origin individuals, and for the city and parishes outside the city of Lucerne. It gives a straightforward overview of the different time trends. For a more precise interpretation of the strength and statistical significance of the time trends, Table 2 reports the estimated yearly changes, separately for the overall trend and for the two splines.

--- Figure 6 about here ---

---Table 2 about here---

Figure 6 does not reveal a pronounced overall trend. While in rural Lucerne homogamy among higher status individuals was declining over the whole period, the very wide confidence intervals suggest imprecisely estimated trends. Table 2 confirms that impression, for with one exception the overall trends are neither strong nor statistically significant. The exception concerns homogamy among higher status individuals married in the city of Lucerne, which slowly but significantly strengthened over time.

If we look at the periods before and after 1865 separately, we see that the trends were more pronounced. With the exception of higher status homogamy in rural areas all trends followed the same pattern as homogamy increased from 1834–64 but decreased after then (all trends are statistically significant except the decrease of homogamy among individuals from lower and middle origin in rural Lucerne ($p = .119$)).

From those results we can infer that the changing severity of the marriage restrictions was the main driver of the trends in homogamy (hypothesis $H3$). In other words, homogamy's development paralleled the changing nature of the marriage restrictions, as described in the literature (Bossard-Borner, 1998, 2008). In Lucerne city

1 this was true for individuals from all social strata, while in rural Lucerne no clear trends
2 have been found for those from higher social origins. That is only partly in line with the
3 rationale behind the hypotheses for the combined effect of modernization and marriage
4 restrictions (*H4*), assuming only the lower strata were affected by the changing marriage
5 restrictions.

6 No evidence was found to support the hypothesis that modernization caused
7 homogamy to decrease over time (*H1*). It is possible that such a trend did exist but was
8 completely masked by other processes, such as the changing marriage restrictions.
9 However, the fact that the only significant overall trend points in the opposite direction
10 suggests that the modernization thesis is missing an important aspect, at least for this
11 early phase of modernization.

12 **4.3 Direct measures**

13 While the time trends do not directly reflect effects on homogamy of modernization, the
14 story told by the direct measures of industrialization and modernization is more
15 nuanced. While the results presented in Figure 7 do not suggest that a rail connection
16 affected homogamy, the proportion of factory workers in a parish did matter.

17 --- Figure 7 about here---

18 Regarding homogamy among individuals of low and middle origin, the results are in
19 line with hypothesis *H6*. In that part of the population homogamy decreased with the
20 proportion of factory workers in the parish. It was moderately and marginally
21 significantly lower in parishes where the proportion of factory workers surpassed 2%,
22 and clearly and highly significantly lower where it exceeded 5%. In respect to
23 homogamy among high-origin individuals, the results remain unclear. While the
24 coefficients are strongly negative, the very large confidence intervals do not permit us

to come to any conclusion.

5 Conclusion and discussion

In addition to new data, three original features of this study have allowed new insights into the effects of social origin on the spouse selection process during the course of modernization, both in general and specifically with respect to the canton of Lucerne.

First, regarding the marriage restrictions I have explicitly considered a phenomenon which interferes with the effects on social homogamy of modernization and industrialization. Next, I have presented theoretical arguments and empirical evidence for a fruitful separation of the analysis of homogamy by social strata. Finally, I have proposed analysing homogamy using multilevel models with constraint simultaneous equations for both directions of explanation. This has provided a way of making available the advantages of multilevel models for the analysis of homogamy by social origin, while respecting its symmetrical and mutually dependent nature.

The results yielded by this approach lead to three conclusions. An interesting first finding is that the homogamy of couples of lower and middle origin was far stronger in rural areas than in the city, while the opposite was true for couples of high social origin. In rural areas the strong homogamy among lower origin individuals was probably the result of the strong homogamy within the farming community (Bull, 2005; Dribe & Lundh, 2009) whereas the very weak high status homogamy may be attributed to the fact that in rural areas it was difficult to find a partner of similarly high origin (van Leeuwen & Maas, 2005, p. 10). Differences in social homogamy between the rural part of the canton and the city of Lucerne were probably caused by two things. First, because of long-standing specificities in patterns of family formation in the cities (Lynch, 1991) and second because of strong migration to the city that itself affected the

processes behind family formation (Moreels & Matthijs, 2010; Schumacher, Matthijs, & Moreels, 2013). Future research focusing on the difference between the city and the countryside should therefore consider both bride's and groom's migration background in order to disentangle the two effects.

A first conclusion from the tests of the derived hypotheses is that they are generally supported by the data, but mainly in respect to homogamy among individuals of lower and middle social origin. For that part of the population, the time trends found in homogamy were in line with presumptions about the effect of marriage restrictions. In other words, homogamy in the canton of Lucerne was strong around 1865 when the marriage restrictions peaked, but lower before and after that peak. That is in line with hypotheses *H3* and *H4* and fits neatly into the picture of the inequality-preserving effects of marriage restrictions drawn by Mantl (1999). In that part of the population the modernization thesis, too, receives support, at least partially. On the one hand the higher homogamy found in the countryside than in the city (*H2*), and the existing negative relationship between the proportion of factory workers and homogamy (*H6*), both support the modernization thesis. On the other hand, a general modernization trend in homogamy (*H1*) was either too weak to offset the effect of the increasing marriage restrictions in the period before 1865 or did not exist at all. Furthermore, the presumed negative relationship between an existing connection to the railway system and homogamy (*H5*) could not be confirmed by the data from Lucerne. As described in the section on the canton of Lucerne, the canton was clearly modernizing during the 19th century – for example in agriculture and education – but industrialization was limited to a few areas. We may therefore interpret the results in the sense that industrialization alone, and no other aspects of modernization, affected homogamy in the canton of Lucerne. That conclusion is broadly in line with previous research on homogamy during

early modernization, as most studies found no clear time trends (Bull, 2005; Dribe & Lundh, 2009; Maas & van Leeuwen, 2005; van Leeuwen & Maas, 2002) although they did find effects of more directly measured industrialization (Lippényi, van Leeuwen, Maas, & Óri, 2017; Maas et al., 2011; Zijdemán & Maas, 2010). Decreasing homogamy by social origin with industrialization suggests that industrialization did indeed change something in the process of family formation. The result is an indication that the influence of parents on family formation diminished during the course of industrialization. In Lucerne, evidence for that can be found only by analysing the effect of directly measured industrialization, as suggested by Puschmann and Solli (2014). The fact that industrialization effects have been found in Lucerne is remarkable insofar as industrialization remained relatively weak even in the areas of the canton that were further industrialized.

While the results for homogamy among individuals of lower and middle origin are essentially in line both with my hypotheses and with previous research, that is not true for homogamy in couples of higher social origin. Although the small number of cases mean that the estimates are imprecise, nevertheless two results clearly contradict the hypotheses derived from the modernization thesis. In that higher stratum homogamy was much stronger in the city than in rural Lucerne, and in the city the overall trend towards homogamy was positive, not negative as claimed by the modernization thesis. Building on sector dualism discussed by Kuznets (1955), the idea of generalized dualism fits these observations, for it assumes that modernization processes such as industrialization or educational expansion, first increase and only later decreases inequality (Knigge et al., 2014; Nielsen, 1994). If increasing concentration of income and wealth was relevant to homogamy it is probable that it affected mainly individuals of high social origin. Consequently, for those couples increasing inequality might have

1 counteracted the otherwise decreasing importance of social origin and led to the
2 observed increase of homogamy by social origin.

3 In the end this study is limited by the data, especially with respect to the
4 population from higher origin brackets. Although the newly collected dataset used for
5 this article includes 1,499 usable observations, it is still relatively small, especially
6 compared against other historical datasets that have grown over time, like the databases
7 from Sweden (Landsarkivet i Lund, 2016; Umeå University, 2016) or the Netherlands
8 (Centraal Bureau voor Genealogie, 2016). That relatively small size naturally limits the
9 data's statistical power, especially if a number of sub-groups are analysed. Furthermore,
10 additional high quality indicators for modernization on the level of the individual
11 parishes would clearly extend the scope of those aspects of modernization which could
12 be analysed.

13 Despite those limitations the new data allows us to study aspects of social
14 stratification in an agrarian area which was partly industrializing during the 19th
15 century. It also allows research on social homogamy to be expanded into a hitherto
16 unstudied context, but most importantly this data has led to the generation of new
17 insights that are worth further investigation. Three key findings raise questions for
18 future research. First, the findings suggest that the relevant mechanisms can differ by
19 social strata. Future researchers might want to respect heterogeneous effects by social
20 strata in order to avoid glossing over existing differences. The second finding reminds
21 us that historical processes are rarely unidimensional and monotonous. In Lucerne,
22 pauperism was attributed to industrialization outside the canton, and the authorities
23 reacted by tightening marriage restrictions. The time trends found in homogamy support
24 the assumption that Lucerne's tightening of its marriage restrictions amplified the
25 importance of social origin in respect to spouse selection, counteracting the effect of

1 modernization. Future research might add to this finding by both explicitly considering
2 and directly measuring political or social reactions to modernization when analysing
3 modernization processes. All the more so in fact, since the third finding confirms the
4 conclusion of previous studies that modernization effects should be tested as directly as
5 possible (Maas et al., 2011; Puschmann & Solli, 2014; Zijdemann & Maas, 2010).
6 Although the time trends in the canton of Lucerne did not reflect any effects of
7 modernization, direct measurements show that industrialization had an effect on
8 homogamy by social origin.

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KZ 14, 16, 18, 19, 23–27, 33, 35, 37, 39, 41, and 54–56

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--- Table A1 about here---

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--- Table A2 about here---

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7 Tables

Table 1. Descriptive statistics of variables used

	Mean (standard deviation)			Minimum	Maximum
	Rural Lucerne	City of Lucerne	Total	Total	Total
Groom's father: HISCAM ^a	51.8 (12.4)	57.1 (12.5)	53.5 (12.7)	32.5	99
Bride's father: HISCAM ^a	51.1 (11.6)	56.7 (12.2)	53.0 (12.1)	33.6	99
Date of marriage (years) ^b	1856.9 (13.2)	1860.7 (13.1)	1858.2 (13.3)	1834	1875
Railway station in parish [*]	0.14	0.64	0.31	0	1
Factory workers in parish: 0–2% [*]	0.76	1	0.84	0	1
Factory workers in parish: 2.1–5% [*]	0.13	0	0.086	0	1
Factory workers in parish: >5% [*]	0.12	0	0.077	0	1
Observations	1002	497	1499		

^a If used as independent variable: centered around 60.9 before transformed into two linear splines: one below and one above this value.

^b Centered around December 31, 1864 before transformed into two linear splines: one before and one after this date.

^{*} Dummy variables, mean = proportion.

1 Table 2. Time trends: yearly changes of parental status homogamy in rural Lucerne and
2 Lucerne city; linear combinations based on models in Table A1¹⁷

	Overall trends	Linear splines
Low to medium status:		
overall (rural)	0.00385	
1834-64 (rural)		0.00886**
1865-75 (rural)		-0.0176
overall (city)	-0.000548	
1834-64 (city)		0.00672***
1865-75 (city)		-0.0217***
High status:		
overall (rural)	-0.00492	
1834-64 (rural)		-0.00315
1865-75 (rural)		-0.0148
overall (city)	0.00217*	
1834-64 (city)		0.00929***
1865-75 (city)		-0.0226*
<i>N</i>	1499	1499

⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

¹⁷ For rural Lucerne, these are merely the interaction effects between the splines for marriage date and fathers' HISCAM, from Table A1. For the city, the table shows the linear combination of those interaction effects and the three-way interactions among year, status and the indicator for the city of Lucerne.

1 Table A1. Time trends: results from regression models

	(1)		(2)	
	Time (linear)		Time (splines)	
	and city vs. countryside		and city vs. countryside	
Coefficients constraint to be equal for both directions of explanation				
Main effects				
HISCAM ≤ 60.9	0.649***	(0.0451)	0.757***	(0.0615)
HISCAM > 60.9	0.0736	(0.0975)	0.0979	(0.198)
Interactions with: HISCAM ≤ 60.9				
City of Lucerne	-0.400***	(0.0498)	-0.380***	(0.0663)
Year	0.00385	(0.00282)		
Year before 1865			0.00886**	(0.00320)
Year from 1865			-0.0176	(0.0113)
City of Lucerne # Year	-0.00440	(0.00296)		
City of Lucerne # Year before 1865			-0.00214	(0.00325)
City of Lucerne # Year from 1865			-0.00418	(0.0115)
Interactions with: HISCAM > 60.9				
City of Lucerne	0.541*	(0.238)	0.641*	(0.277)
Year	-0.00492	(0.0112)		
Year before 1865			-0.00315	(0.0136)
Year from 1865			-0.0148	(0.0430)
City of Lucerne # Year	0.00709	(0.0111)		
City of Lucerne # Year before 1865			0.0124	(0.0138)
City of Lucerne # Year from 1865			-0.00780	(0.0446)
Random effects				
Var(HISCAM > 60.9)	0.315	(0.0829)	0.323	(0.0882)
Additional coefficients explaining bride's father's HISCAM				
Year	0.00209	(0.0422)		
Year before 1865			0.0476	(0.0596)
Year from 1865			-0.210	(0.219)
City of Lucerne	-0.446	(0.703)	-0.573	(1.003)
City of Lucerne # Year	-0.0683	(0.0428)		
City of Lucerne # Year before 1865			-0.0615	(0.0600)
City of Lucerne # Year from 1865			-0.00886	(0.219)
Constant	58.12	(0.653)	59.05	(0.979)
Random effects				
Var(Constant)	4.965	(1.201)	4.773	(1.176)
Var(Residual)	109.5	(10.34)	109.3	(10.34)
Additional coefficients explaining groom's father's HISCAM				
Year	0.0600	(0.0457)		
Year before 1865			0.110*	(0.0500)
Year from 1865			-0.170	(0.179)
City of Lucerne	-2.036	(1.577)	-2.365	(1.773)
City of Lucerne # Year	-0.0338	(0.0497)		
City of Lucerne # Year before 1865			-0.0449	(0.0515)
City of Lucerne # Year from 1865			0.0731	(0.187)
Constant	57.98	(0.718)	59.16	(0.797)
Random effects				
Var(Constant)	6.500	(1.567)	6.716	(1.596)
Var(Residual)	80.22	(9.953)	79.65	(10.10)
Observations	1499		1499	

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1 Table A2. Railway stations and factory workers: results from regression models

	(1)		(2)		(3)	
	Basic: time, rural only		Basic + railway station		Basic + factory workers	
Coefficients constraint to be equal for both directions of explanation						
Main effects						
HISCAM ≤ 60.9	0.757***	(0.0615)	0.745***	(0.0673)	0.805***	(0.0685)
HISCAM > 60.9	0.109	(0.200)	0.113	(0.218)	0.153	(0.227)
Interactions with: HISCAM ≤ 60.9						
Year before 1865	0.00880**	(0.00318)	0.00838*	(0.00341)	0.0107**	(0.00325)
Year from 1865	-0.0176	(0.0113)	-0.0175	(0.0113)	-0.0149	(0.0109)
Railway station in parish			0.0827	(0.112)		
Factory workers in parish: 2.1-5%					-0.161 ⁺	(0.0932)
Factory workers in parish: >5%					-0.265**	(0.0978)
Interactions with: HISCAM > 60.9						
Year before 1865	-0.00258	(0.0137)	-0.00233	(0.0148)	-0.000596	(0.0145)
Year from 1865	-0.0165	(0.0432)	-0.0158	(0.0444)	-0.00969	(0.0415)
Railway station in parish			-0.0359	(0.348)		
Factory workers in parish: 2.1-5%					-0.108	(0.433)
Factory workers in parish: >5%					-0.811	(0.646)
Random effects						
Var(HISCAM > 60.9)	0.340	(0.0952)	0.337	(0.0954)	0.449	(0.151)
Additional coefficients explaining bride's father's HISCAM						
Year before 1865	0.0468	(0.0596)	0.0342	(0.0666)	0.0718	(0.0660)
Year from 1865	-0.211	(0.219)	-0.212	(0.220)	-0.203	(0.223)
Railway station in parish			1.952	(1.776)		
Factory workers in parish: 2.1-5%					-1.921	(1.507)
Factory workers in parish: >5%					-3.060	(1.929)
Constant	59.04	(0.981)	58.70	(1.129)	59.70	(1.162)
Random effects						
Var(Constant)	5.077	(1.226)	4.799	(1.160)	5.145	(1.276)
Var(Residual)	105.7	(11.21)	105.6	(11.23)	105.5	(11.27)
Additional coefficients explaining groom's father's HISCAM						
Year before 1865	0.109*	(0.0499)	0.110*	(0.0521)	0.151**	(0.0536)
Year from 1865	-0.169	(0.180)	-0.175	(0.181)	-0.119	(0.177)
Railway station in parish			0.0311	(1.661)		
Factory workers in parish: 2.1-5%					-3.439**	(1.083)
Factory workers in parish: >5%					-5.966***	(1.553)
Constant	59.15	(0.797)	59.17	(0.875)	60.29	(0.985)
Random effects						
Var(Constant)	6.929	(1.668)	6.998	(1.678)	6.769	(1.539)
Var(Residual)	72.95	(9.130)	72.95	(9.127)	71.73	(9.190)
Observations	1002		1002		1002	

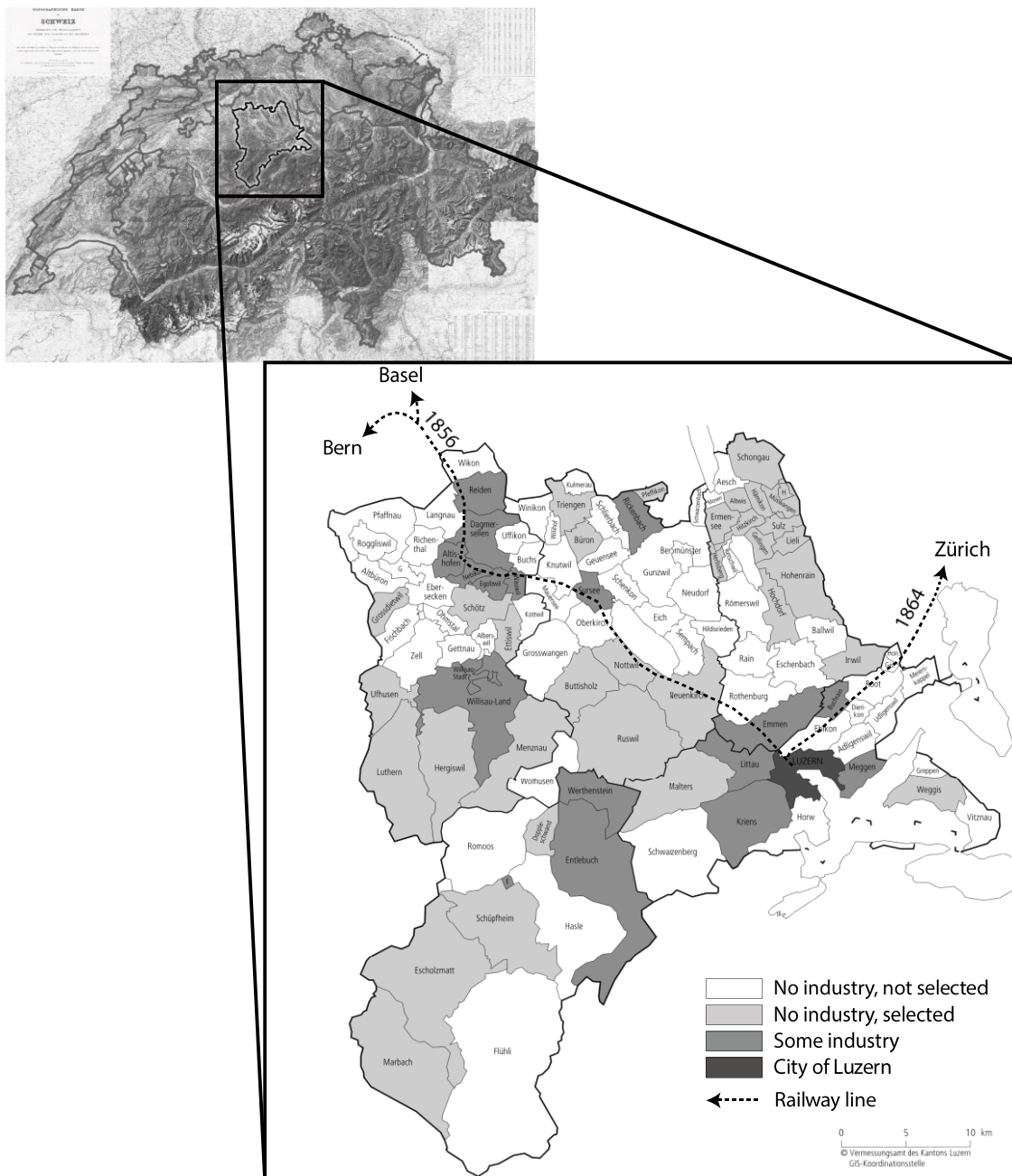
Standard errors in parentheses

⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

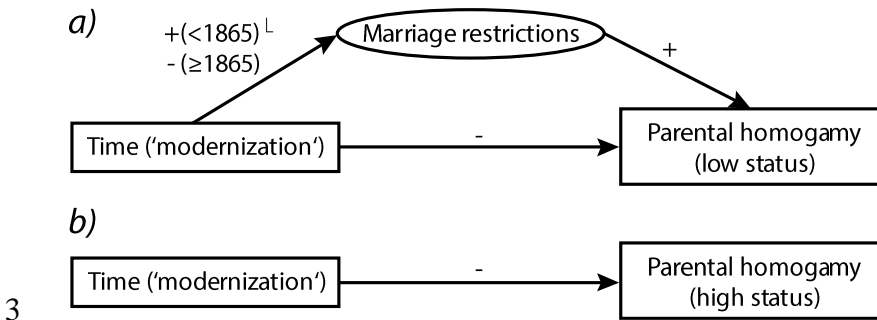
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8 Figures

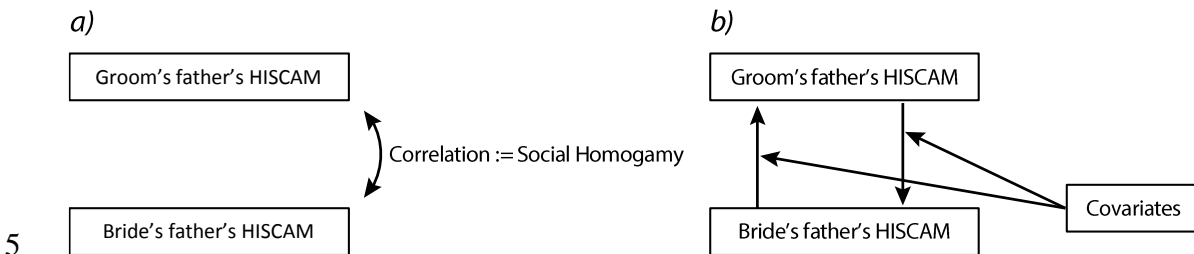
Figure 1. Map of Switzerland, and map showing the selected parishes within the canton of Lucerne. Sources: map of Switzerland: Dufour (1855), reproduced by permission of swisstopo (BA17032); map of Lucerne: Schnider (1996, 48, 261), reproduced by permission of Geoinformation Kanton Luzern; railway lines added according to: Wägli and Jacobi (2010); own shading.



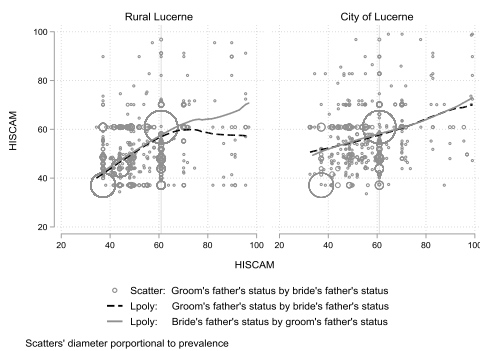
- 1 Figure 2. Scheme of the combination of the effects on homogamy of modernization and
 2 marriage restriction among individuals of (a) low to middle and (b) high social origin.



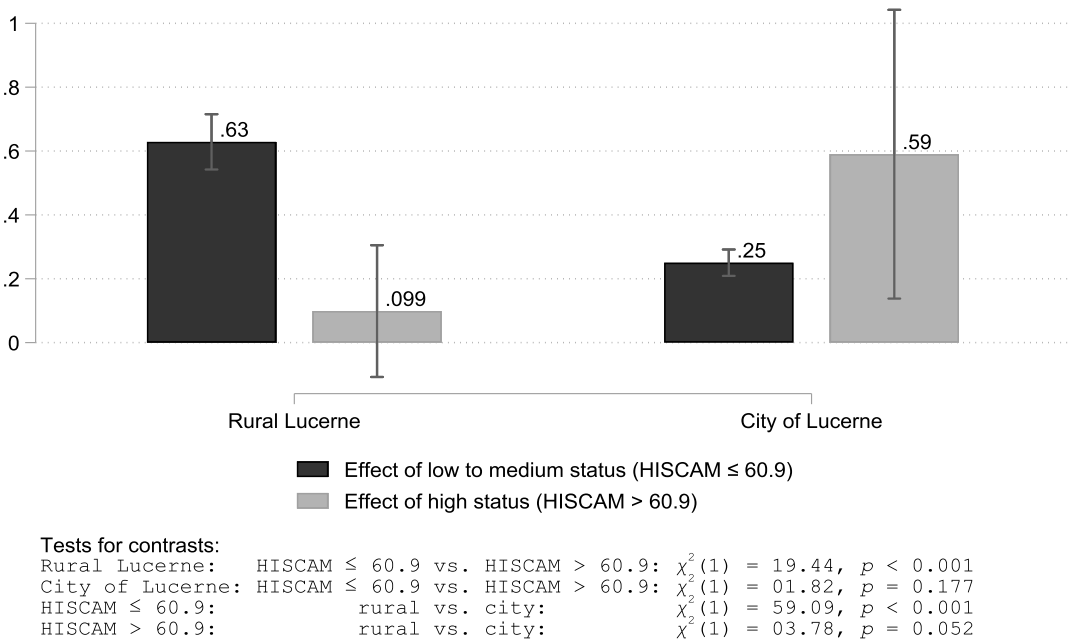
- 4 Figure 3. Measuring (a) and explaining (b) social homogamy.



- 6 Figure 4. Groom's father's and bride's father's status for rural Lucerne and Lucerne
 7 city: scatterplots and local polynomial (lpoly) smooth plots; circle sizes are proportional
 8 to the prevalence of the status combinations.

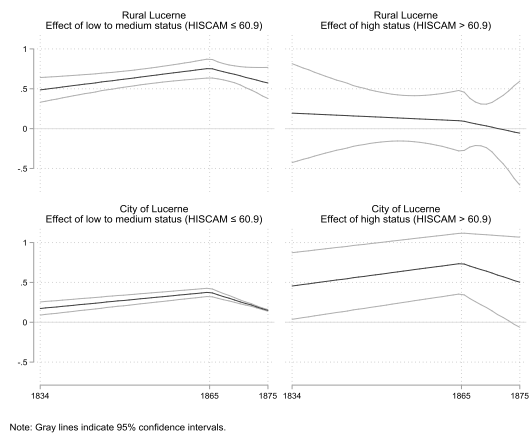


1 Figure 5. City vs. countryside: parental status homogamy by social stratum; average
 2 marginal effects based on model 1 in Table A1.

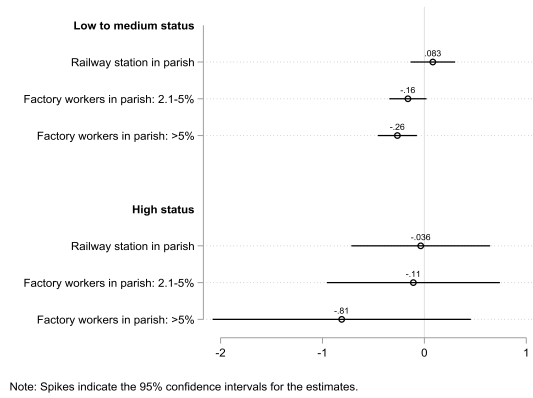


Note: Spikes indicate 95% confidence intervals.

1 Figure 6. Time trends: parental status homogamy by date of marriage and social stratum
2 in the city of Lucerne and in the countryside; average marginal effects based on model 2
3 in Table A1.



1 Figure 7. Effects on parental status homogamy of railway station in parish, and of
2 proportion of factory workers by social stratum; graphical representation of selected
3 coefficients from model 2 and 3 in Table A2.



4